

## On the Distribution of the Hawaiian Ghost Crab, *Ocypode laevis* Dana<sup>1</sup>

DAVID P. FELLOWS<sup>2</sup>

**ABSTRACT:** The presence of a small breeding population of *Ocypode laevis* at Enewetak Atoll, Marshall Islands, is reported, and morphological and behavioral comparisons are made with the Hawaiian *O. laevis*. Previous distribution records for the species are discussed and corrected.

IN ADDITION to known populations of *Ocypode ceratophthalmus* and *O. cordimana*, a small population of a third species of *Ocypode* was discovered in July 1973 on Enewetak Atoll, Marshall Islands. The specimens (three females, four males) conform closely to the original description (Dana 1852) of *O. laevis* and are in complete agreement with the more recent diagnosis of that species by Edmondson (1962). Gonopods of the one mature male match Crosnier's (1965) figure for *O. laevis*.

Comparisons between Hawaiian *O. laevis* and the specimens from Enewetak reveal some differences with regard to eye color and stridulatory organ. Whereas Enewetak specimens have a uniformly dark green cornea, those from Hawaii have a bright yellow cornea with a distal black cap. This difference is evident only in living specimens. The stridulatory ridge (Figure 1) appears more massive and has more teeth in the Hawaiian specimens. Examination of a series of specimens from Hawaii suggests that stridulatory tooth count varies with the size and sex of the individual. Among size-paired males, tooth count averaged  $39.2 \pm 2.8$  for Hawaii ( $N = 3$ ) versus  $36.0 \pm 3.6$  for Enewetak ( $N = 3$ ); respective counts for size-paired females ( $N = 3$  per locality) were  $26.0 \pm 3.8$  and  $19.7 \pm 1.1$ . Results of an individual  $t$ -test with sexes combined suggest that

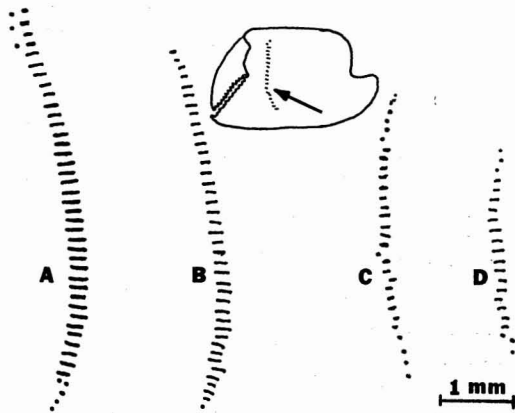


FIGURE 1. *Ocypode laevis* stridulatory ridges. Hawaiian male (A) and female (C); Enewetak male (B) and female (D). Traced from photographs of equal-sized specimens. Location of ridge on palm of major chela indicated by arrow.

the difference in tooth counts between the two localities is significant ( $t$ ,  $5df = 3.39$ ,  $P < 0.05$ ). If this difference is real, it is possible that the two populations may use different "dialects" for auditory communication (Horch and Salmon 1969).

Ecological differences were also evident. In Hawaii, mature males burrow in the uppermost intertidal and dry beach zones and mature females and juveniles inhabit the strand vegetation just inland of the beach (Fellows 1966). The limited number found at Enewetak displayed a more random zonation, with all age and sex classes extending from the low intertidal upward into the vegetation zone. Moreover, in Hawaii *O. laevis* maintains large populations on all beach types, but at Enewetak the species was found only on the high, well-developed beaches on Rex and Leroy islets,

<sup>1</sup> This paper resulted from research at the Enewetak Marine Biological Laboratory operated by the United States Atomic Energy Commission. The Commission's support is gratefully acknowledged, as is the aid of laboratory personnel. Manuscript received 14 September 1974.

<sup>2</sup> University of Hawaii, Department of General Science, Honolulu, Hawaii 96822. Present address: Wildlife Damage Research Station, P.O. Box 244, Hilo, Hawaii 96720.

where it appears to comprise less than 0.5 percent of the resident *Ocypode*. Even so, the presence of full spermathecae in two of the females suggests that reproduction is occurring on the atoll.

Distribution records for *O. laevis* are uncertain, but the species seems predominantly Hawaiian. Based on specimens in the Bernice P. Bishop Museum, Edmondson (1962) reported *O. laevis* from all of the major Hawaiian Islands, Laysan, Johnston, Rarotonga, and the Line Islands. The Line Island record is based upon doubtfully labeled specimens from Washington and Palmyra islands. The relative length of the walking legs, coupled with carapace and chelar proportions, suggests that the Palmyra specimens are in fact juvenile *O. ceratophthalmus*, whereas the Washington specimens, due to their large size, chelar shape, and complete absence of a stridulatory organ, are undoubtedly *O. cordimana*. Moreover, I was unable to find any *O. laevis* during extensive fieldwork on *Ocypode* in the southern Line Islands (Fellows 1973). In contrast, the Rarotongan (Cook Islands) record appears valid; three specimens, two of them misidentified as *O. ceratophthalmus*, were found in Edmondson's material. Numerous specimens in the Bishop Museum collection also substantiate the Johnston Island record, and the discovery of a misidentified specimen from Midway Island further extends the Hawaiian records to include the entire length of the Hawaiian chain.

The preferred habitat of *O. laevis* in Hawaii is preempted at Enewetak and elsewhere by *O. cordimana* (Fellows 1973). The zonation and low densities of *O. laevis* at Enewetak suggest that this species may be competitively displaced by the more aggressive *O. cordimana* in areas of

sympatry. This, coupled with the general resemblance between *O. cordimana* and *O. laevis*, suggests that small unnoticed populations of *O. laevis* may in fact be widespread throughout the eastern and central Indo-Pacific.

#### LITERATURE CITED

- CROSNIER, A. 1965. Crustacés decapodés Grapsidae et Ocypodidae. Faune Madagascar 18: 1-143.
- DANA, J. D. 1852. Crustacea. Part I. United States exploring expedition, during the years 1838, 1839, 1840, 1841, 1842, under the command of Charles Wilkes, U.S.N. Vol. 13. C. Sherman, Philadelphia. 685 pp.
- EDMONDSON, C. H. 1962. Hawaiian Crustacea: Goneplacidae, Pinnotheridae, Cymopoliidae, Ocypodidae, and Gecarcinidae. Occ. Pap. Bernice P. Bishop Mus. 23(1): 1-27.
- FELLOWS, D. P. 1966. Zonation and burrowing behavior of the ghost crabs *Ocypode ceratophthalmus* and *Ocypode laevis* in Hawaii. M.S. Thesis. University of Hawaii, Honolulu. 78 pp.
- . 1973. Behavioral ecology of the ghost crabs *Ocypode ceratophthalmus* and *Ocypode cordimana* at Fanning Atoll, Line Islands. Pages 219-241 in K. E. Chave and E. Alison Kay, principal investigators. Fanning Island Expedition, July and August, 1972. HIG-73-13. University of Hawaii, Hawaii Institute of Geophysics, Honolulu. iv + 320 pp.
- HORCH, K. W., and M. SALMON. 1969. Production, perception and reception of acoustic stimuli by semiterrestrial crabs (genus *Ocypode* and *Uca*, family Ocypodidae). Forma Functio 1: 1-25.